

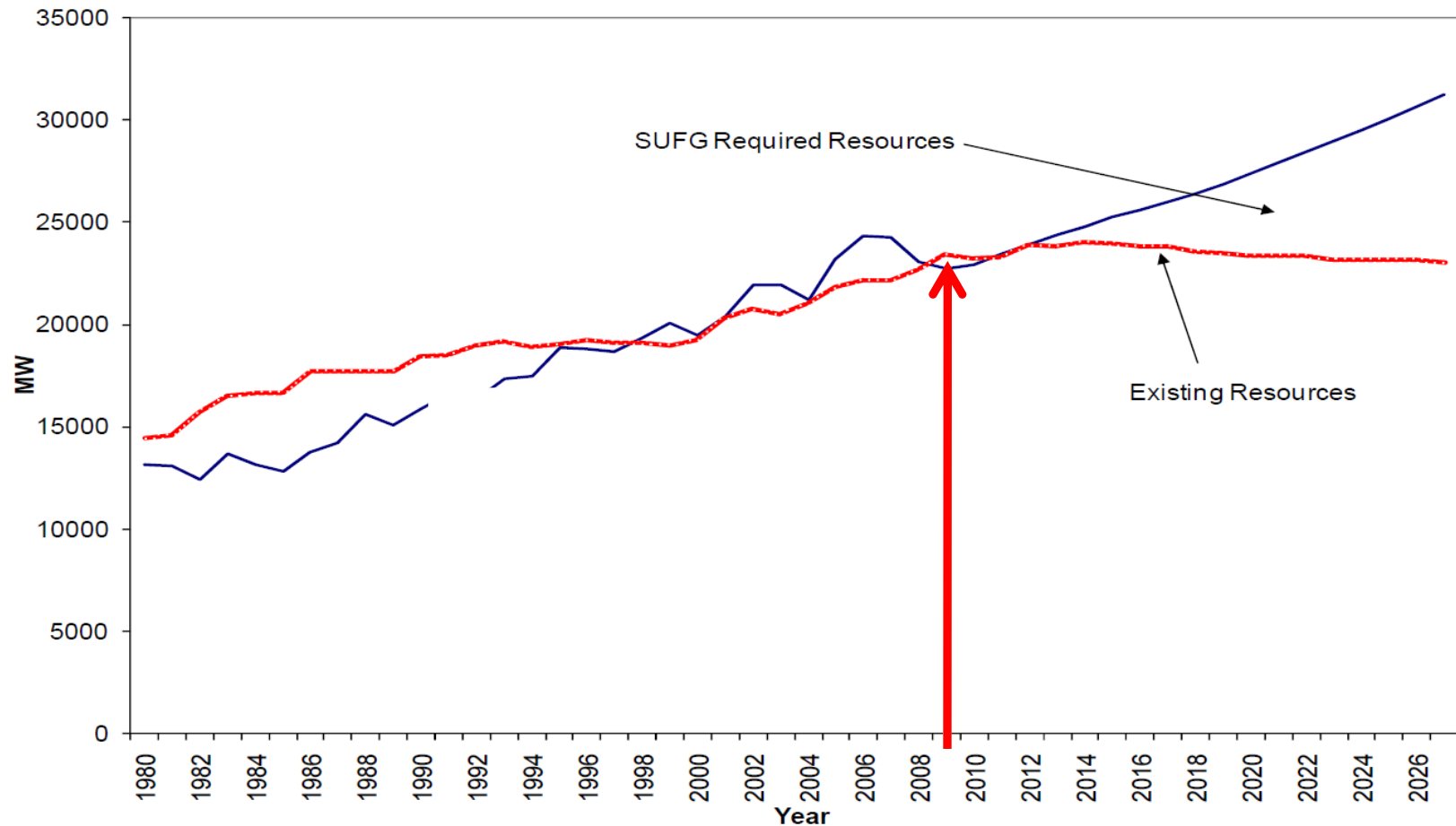
# Here comes the sun



# Premises

- We will need more electricity in the future.
- Energy from the sun can produce electricity.
- Distributed solar power is a good solution for meeting future electrical needs and keeping energy prices low.

# Indiana will need more generation capacity in the future



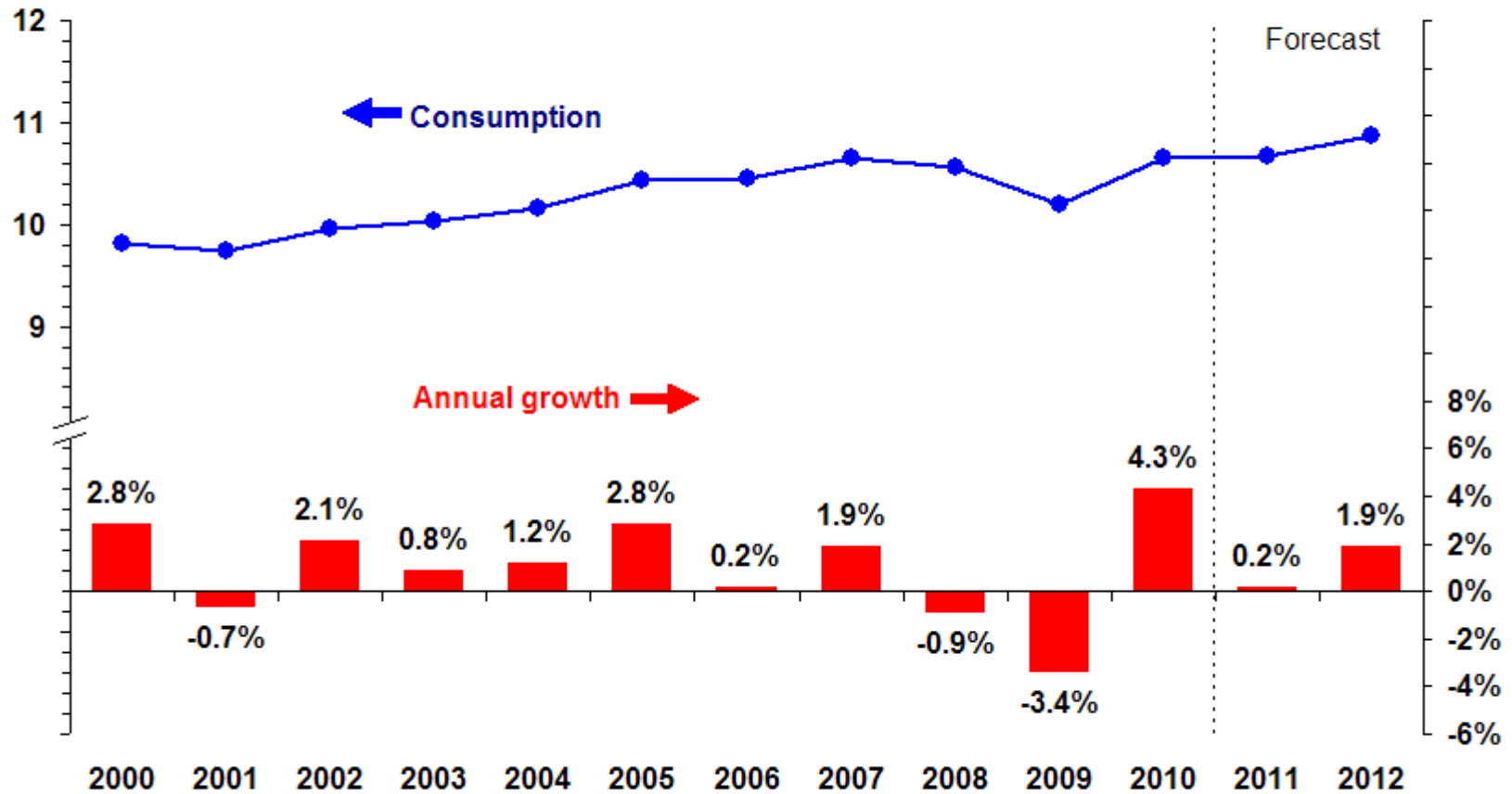
Source: State Utility Forecasting Group 2009 Energy Report



## U.S. Total Electricity Consumption

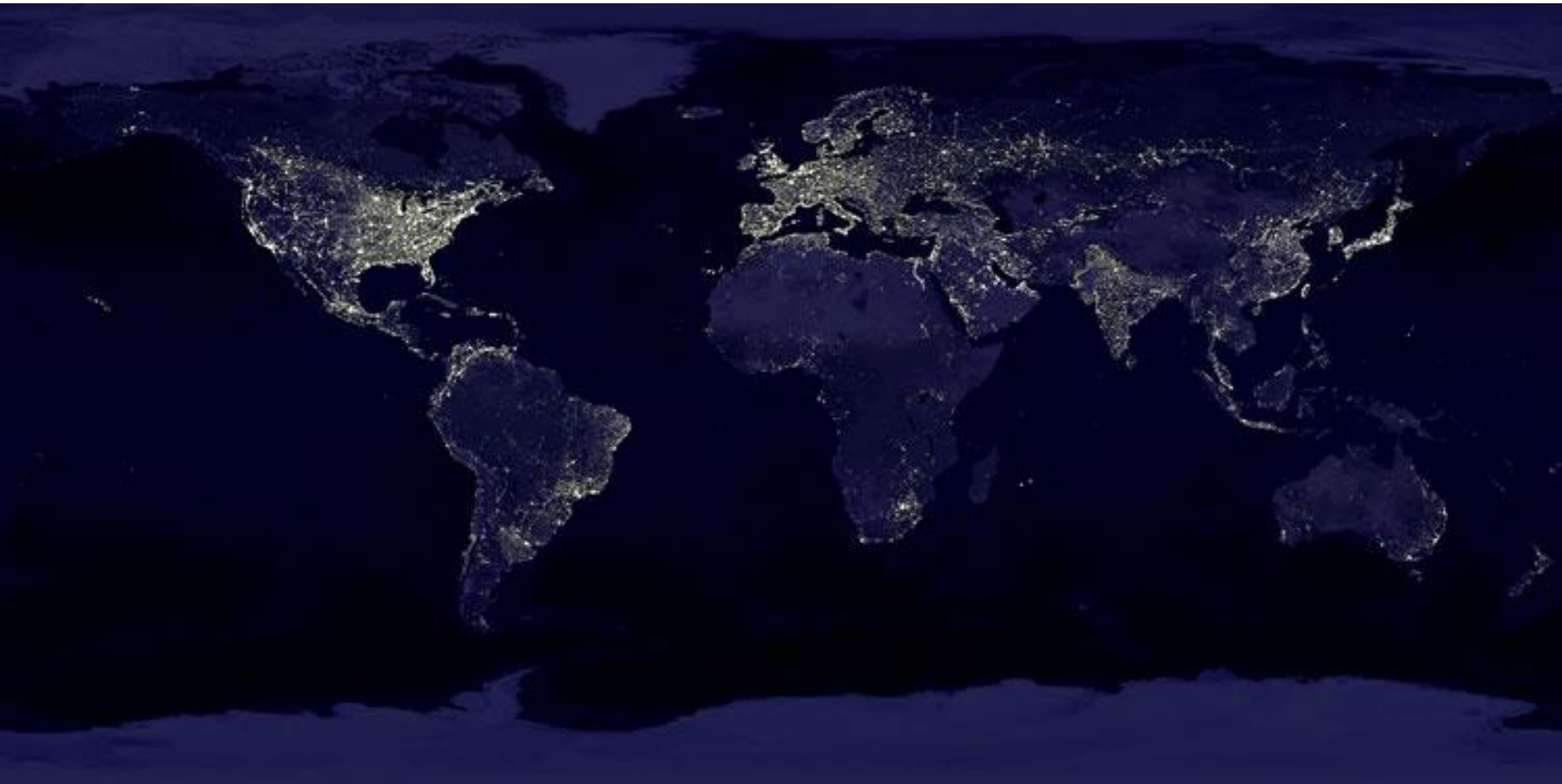
billion kilowatthours per day

change from prior year



Source: Short-Term Energy Outlook, July 2011










Source: NASA






**Global energy consumption in 2008 was 15TW!**



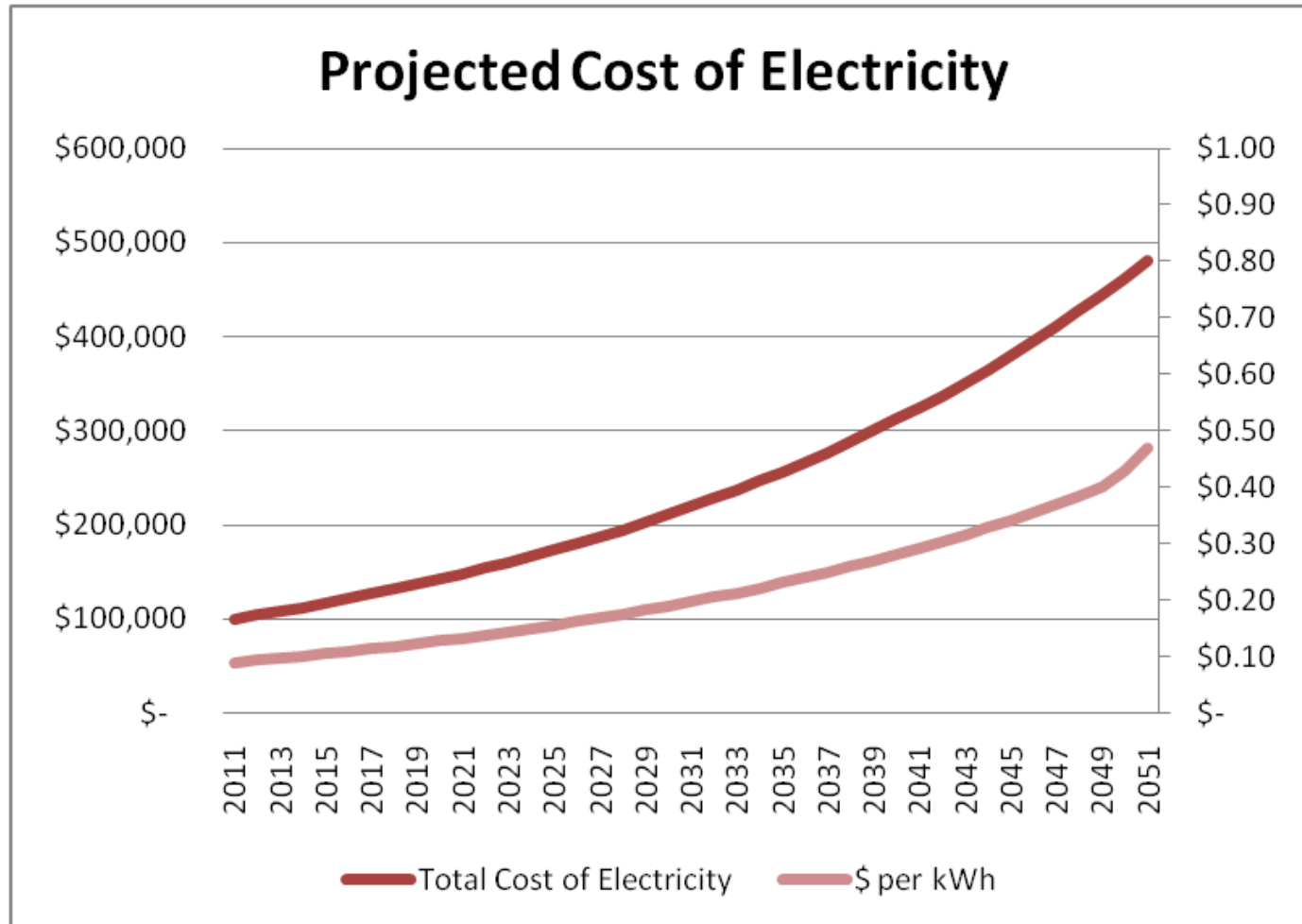
# Remember when ...

	1970		2011	Percentage increase
Cost of a 1 <sup>st</sup> class stamp	\$0.06		\$0.44	633%
Cost of a regular gallon of gas	\$0.36/gal		\$3.96/gal	1000%
Loaf of bread	\$0.25/loaf		\$2.08/loaf	732%
Average ground beef per pound	\$0.70/lb		\$3.09/lb	341%
Electric power cents per kWh	\$0.017/kWh		\$0.088/kWh	417%

# ... and if the past predicts the future ...

	2011		2051	Percentage increase
Cost of a 1 <sup>st</sup> class stamp	44¢		\$3.23	633%
Cost of a regular gallon of gas	\$3.96/gal		\$43.56/gal	1000%
Loaf of bread	\$2.08/loaf		\$17.31/loaf	732%
Average ground beef per pound	\$3.09/lb		\$13.63/lb	341%
Electric power cents per kWh	\$0.09/kWh		\$0.47/kWh	<u>417%</u>

# ... supply and demand will govern



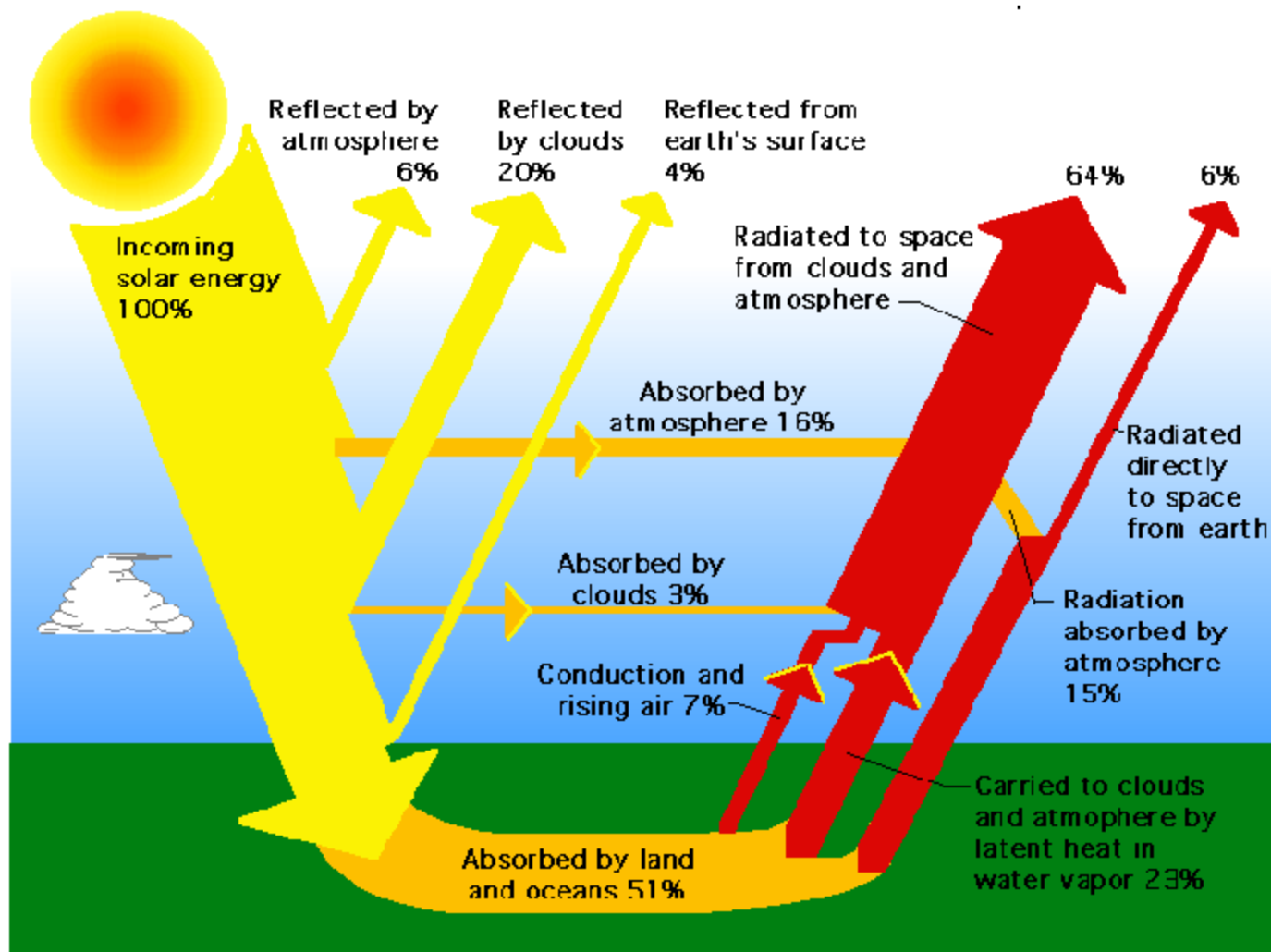


**Okay, so we need more power.  
Where do we get it?**

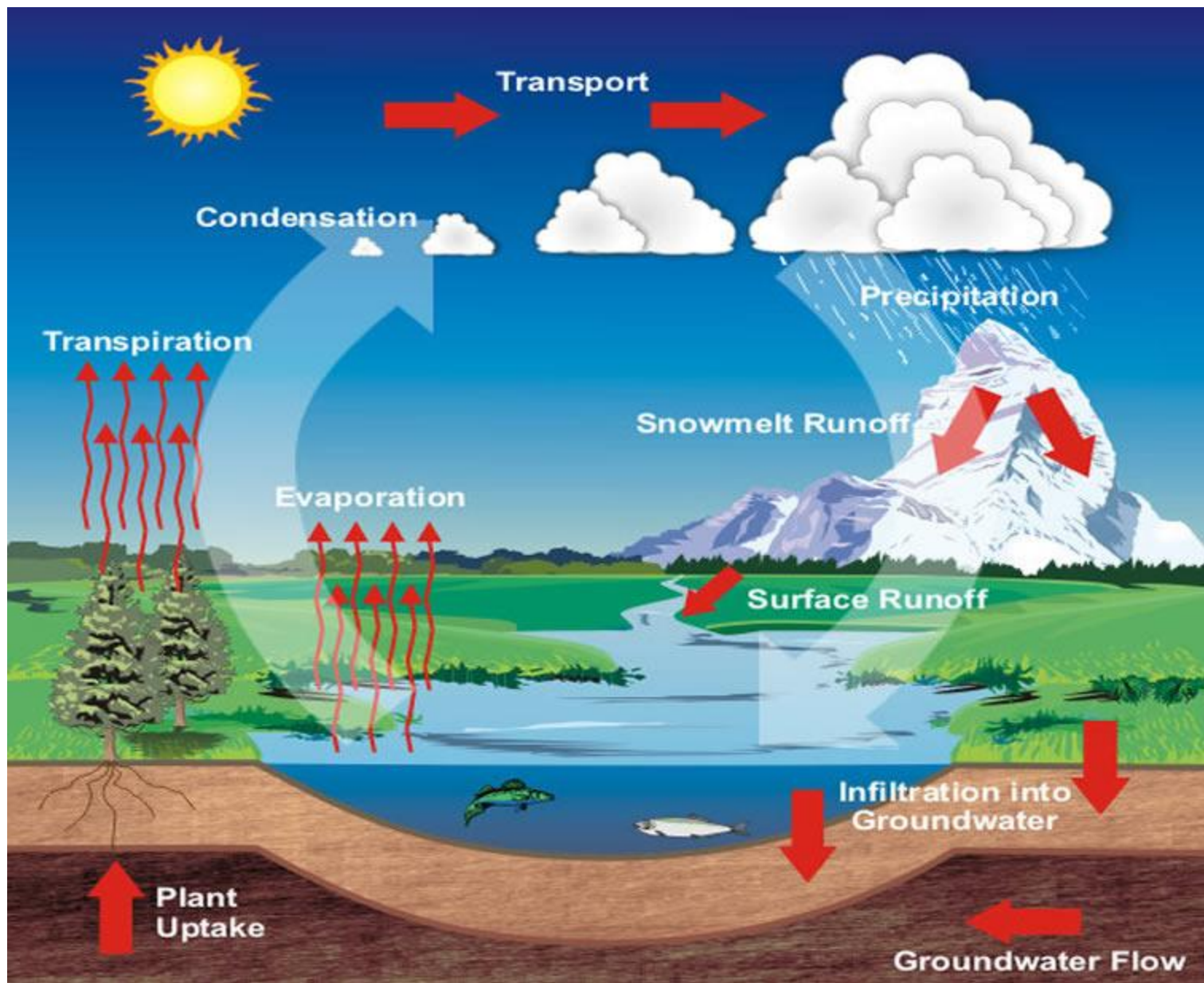


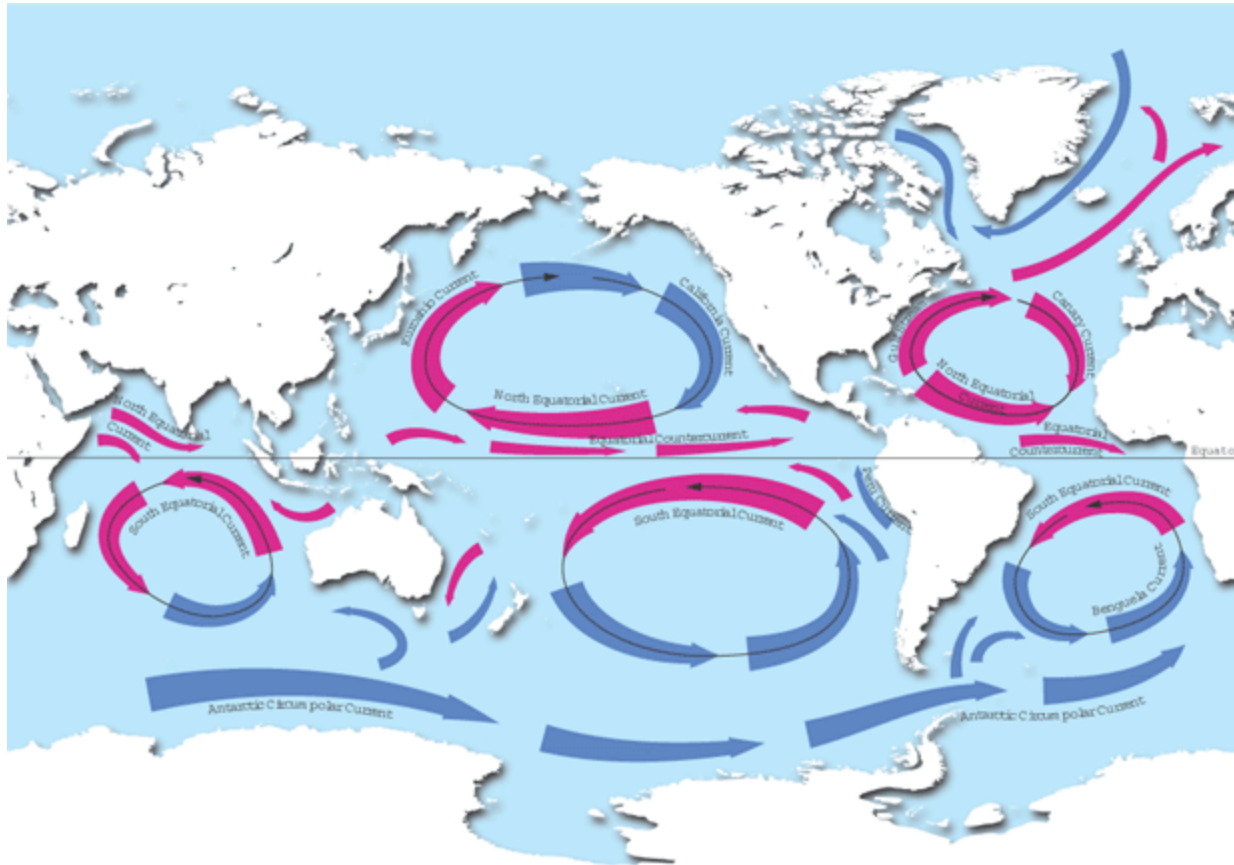
# You are my sunshine ...





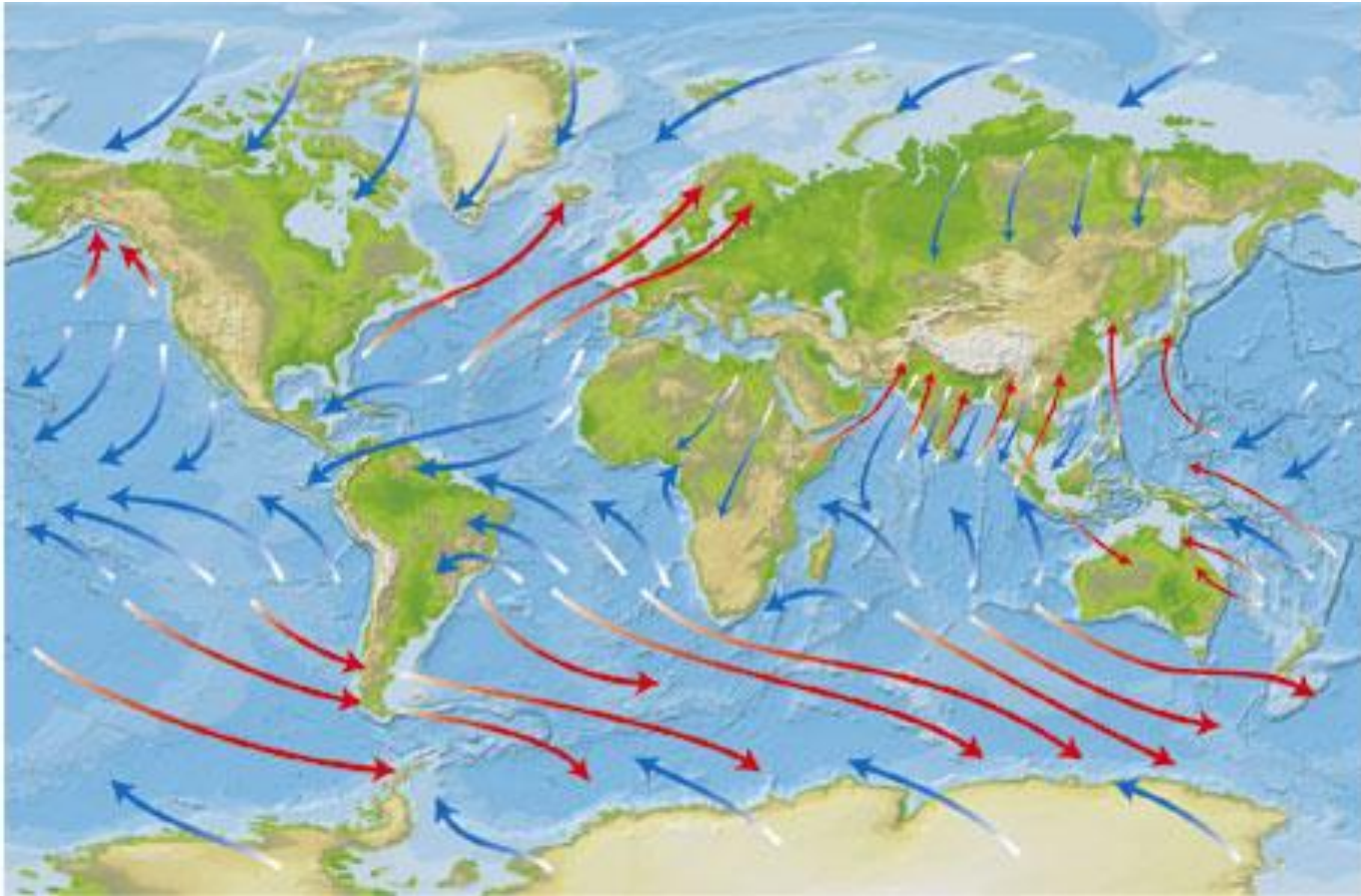




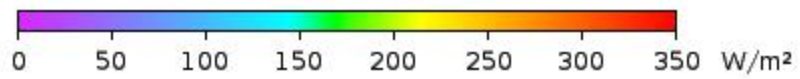
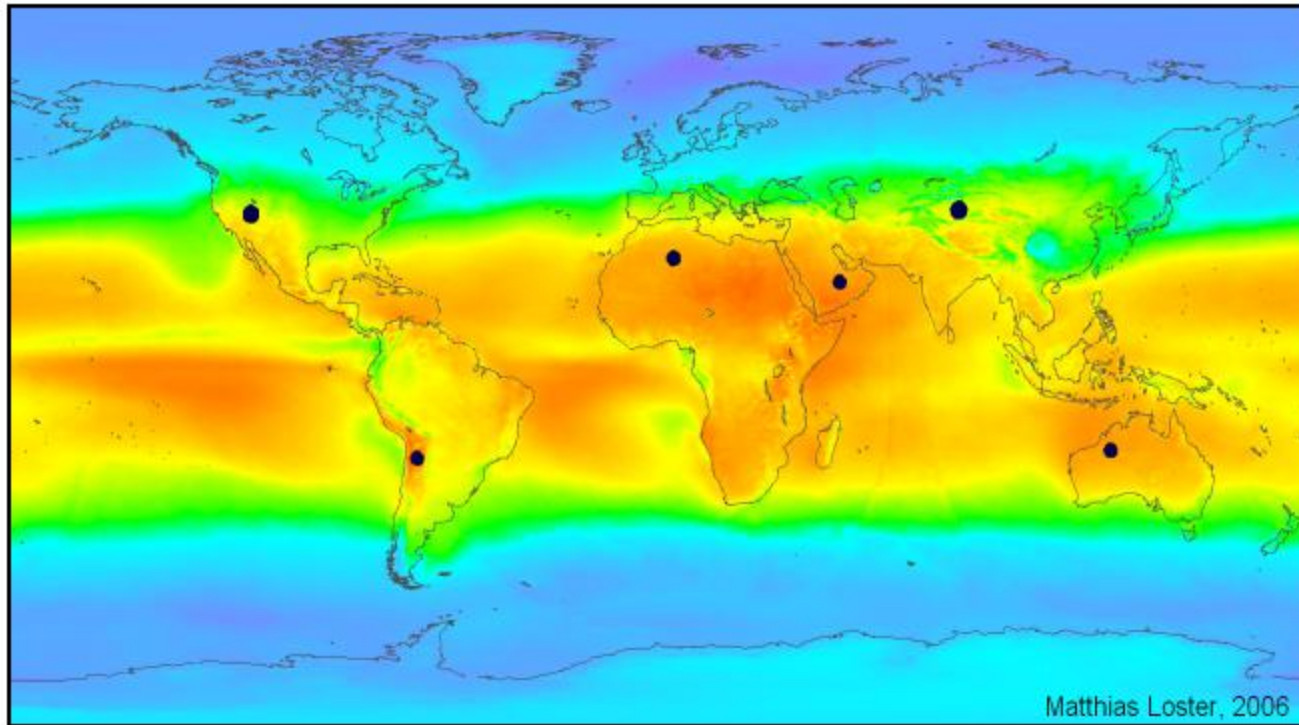


Surface Ocean Currents









$$\Sigma \bullet = 18 \text{ TWe}$$

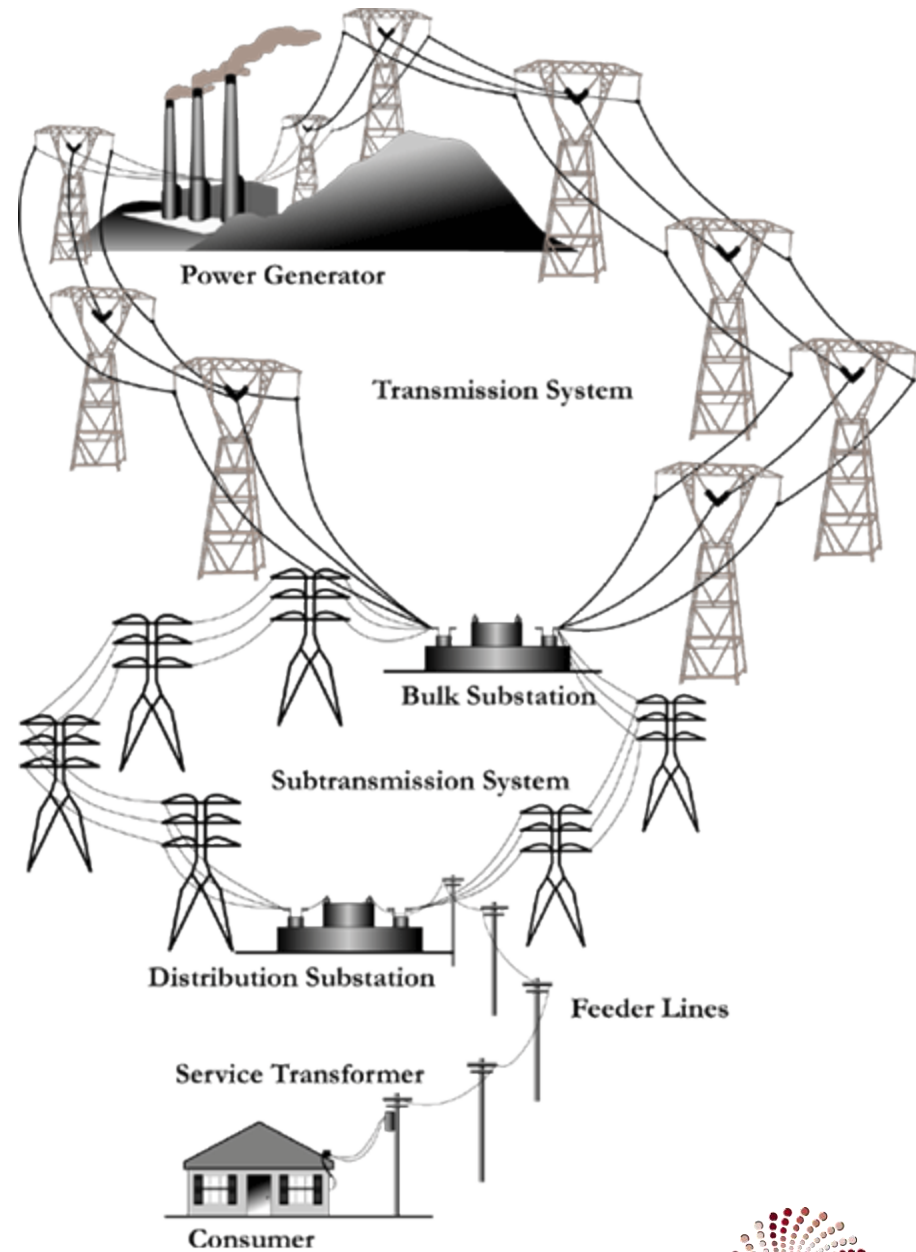
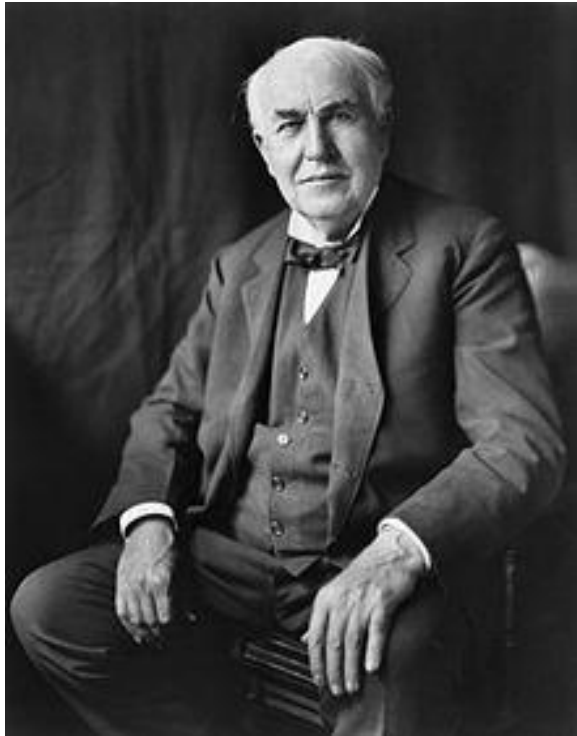
Source: Matthias Loster, 2010



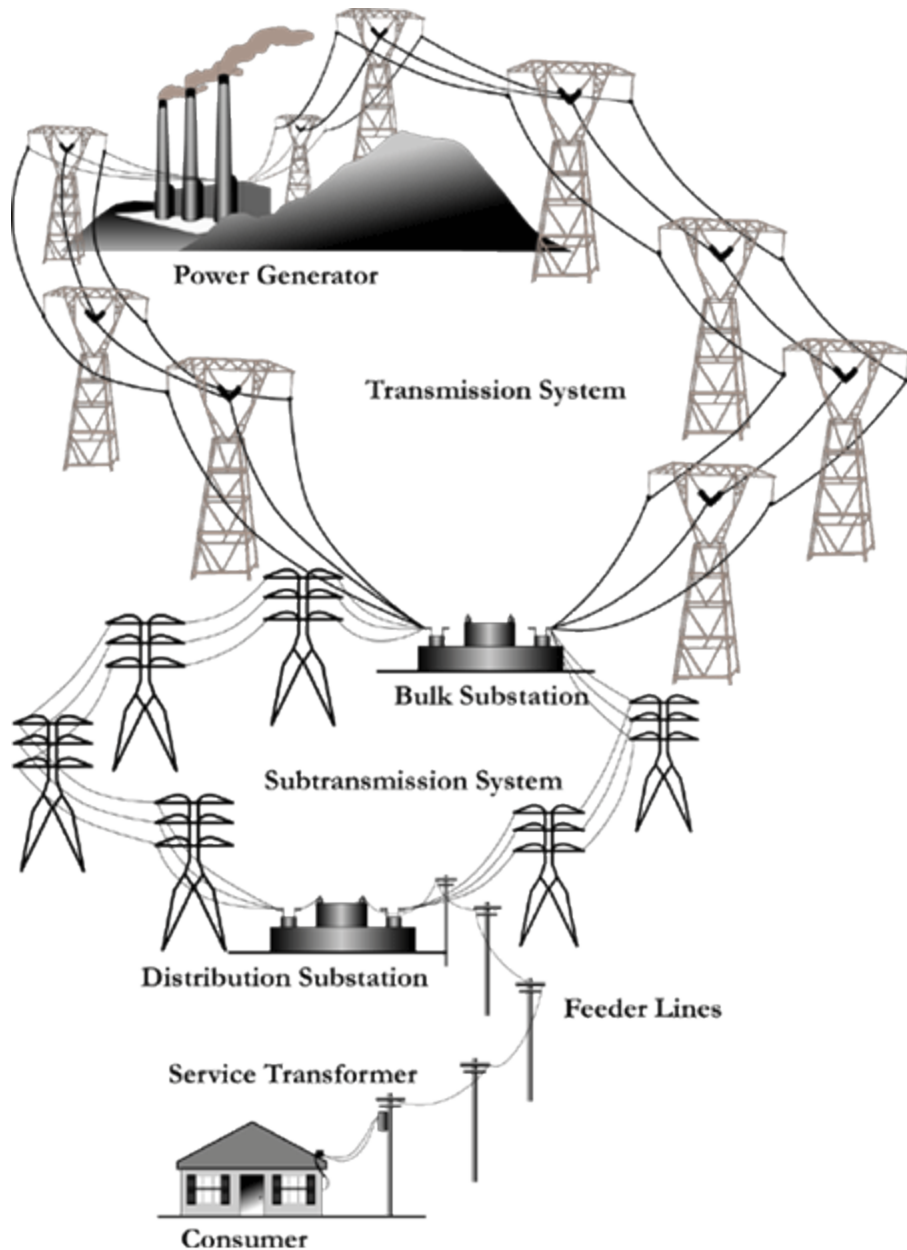
**If we have all this solar energy available, how do we use it?**



# Centralized Generation made sense ... in 1900





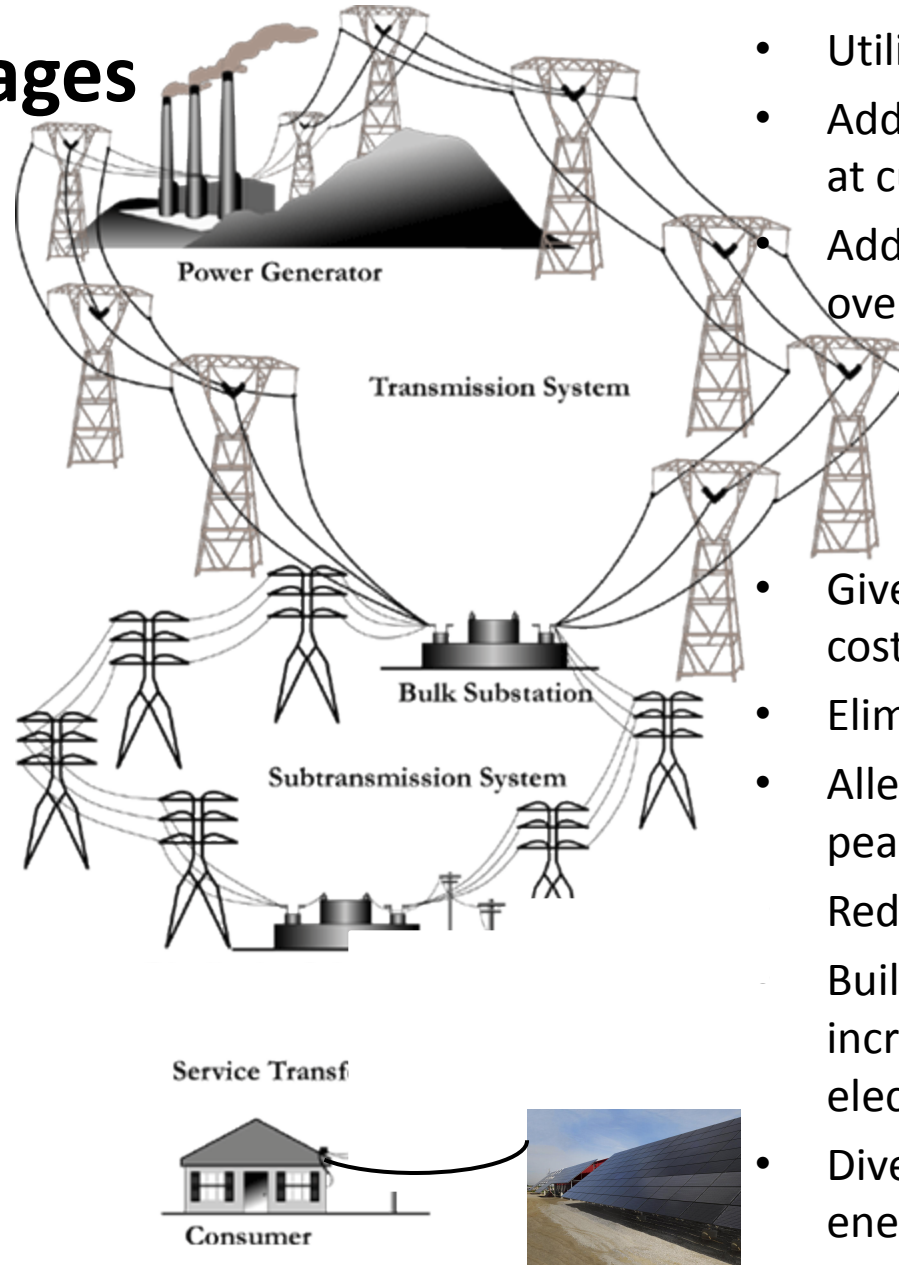


# Centralized Generation has Drawbacks

- Transmission and distribution costs
- Line loss
- Investment in transmission and distribution networks
- Electrification of rural areas
- Loss of use of ancillary energy produced, e.g., heat
- Grid security and reliability
- Price stability

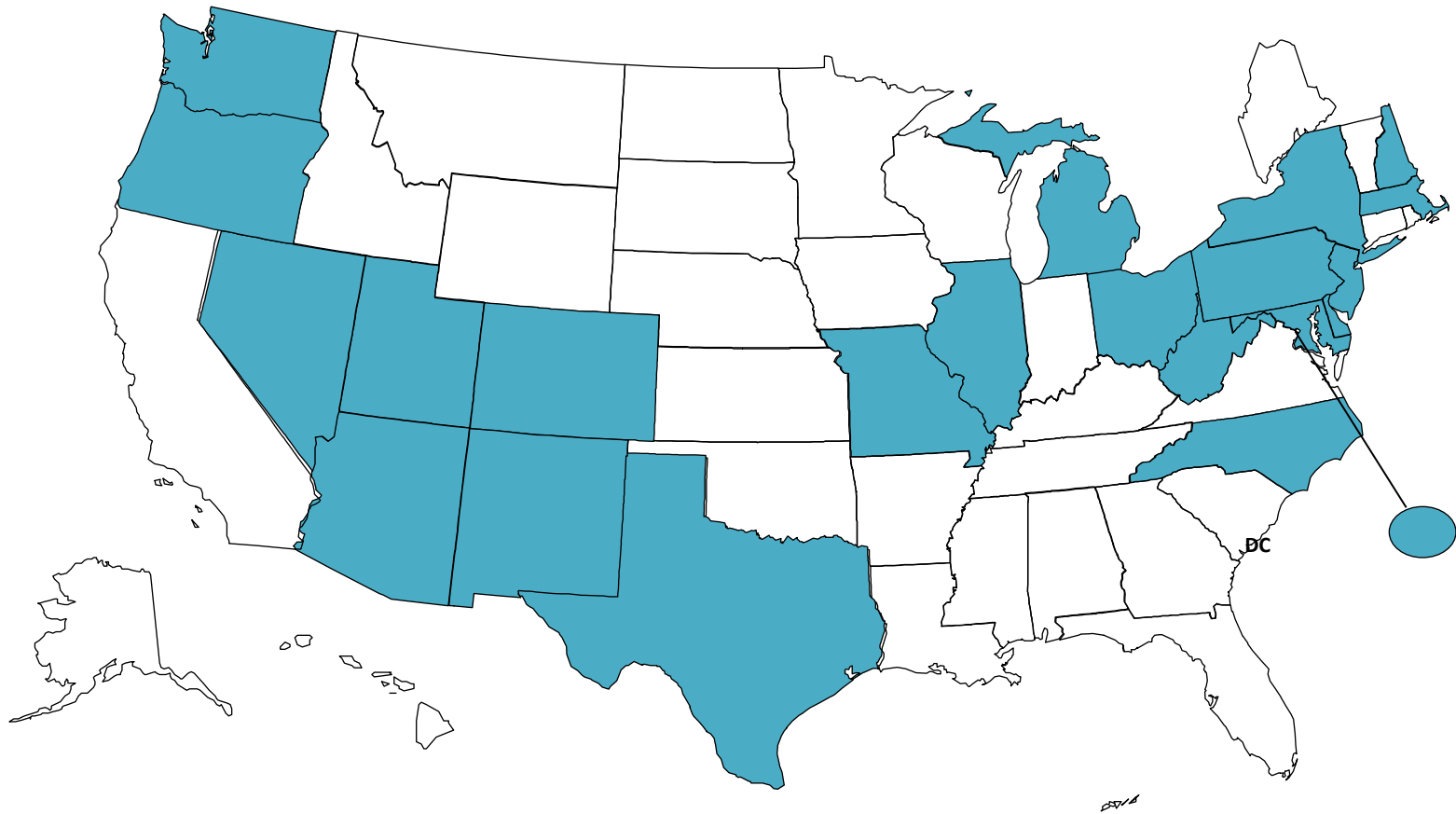
# Distributed Generation has Advantages

- Improved reliability via disruption prevention for both end user and grid
- May be developed more quickly than central station generators
- Potential to save energy producers and consumers money
- Utilizes existing infrastructure
- Avoids need for new infrastructure



- Rural electrification
- Utilization of heat and power
- Adding generation capacity at customer site
- Adding capacity to the overall system
- Gives consumers greater cost stability
- Eliminates line loss
- Alleviates peak demand – peak shaving
- Reduces emissions
- Builds redundancy that increases grid security for electric utility
- Diversifies Indiana's energy portfolio

# States with Distributed Generation Goals



Source: Database of State Incentives for Renewables & Efficiency



# Indiana's Approach to Distributed Generation

- Indiana has adopted a statutory and regulatory structure for distributed generation.
- Regulations require electricity generated from small-scale, customer-sited technologies (i.e., fuel cells, microturbines, photovoltaics, wind turbines) to be interconnected with large, investor owned electric utilities.
- Indiana's alternative energy production statute in fact requires public utilities and municipally owned utilities to interconnect with and enter into long term contracts for the purchase of electricity from customer-sited alternative energy production facilities with a capacity of less than 80 megawatts.

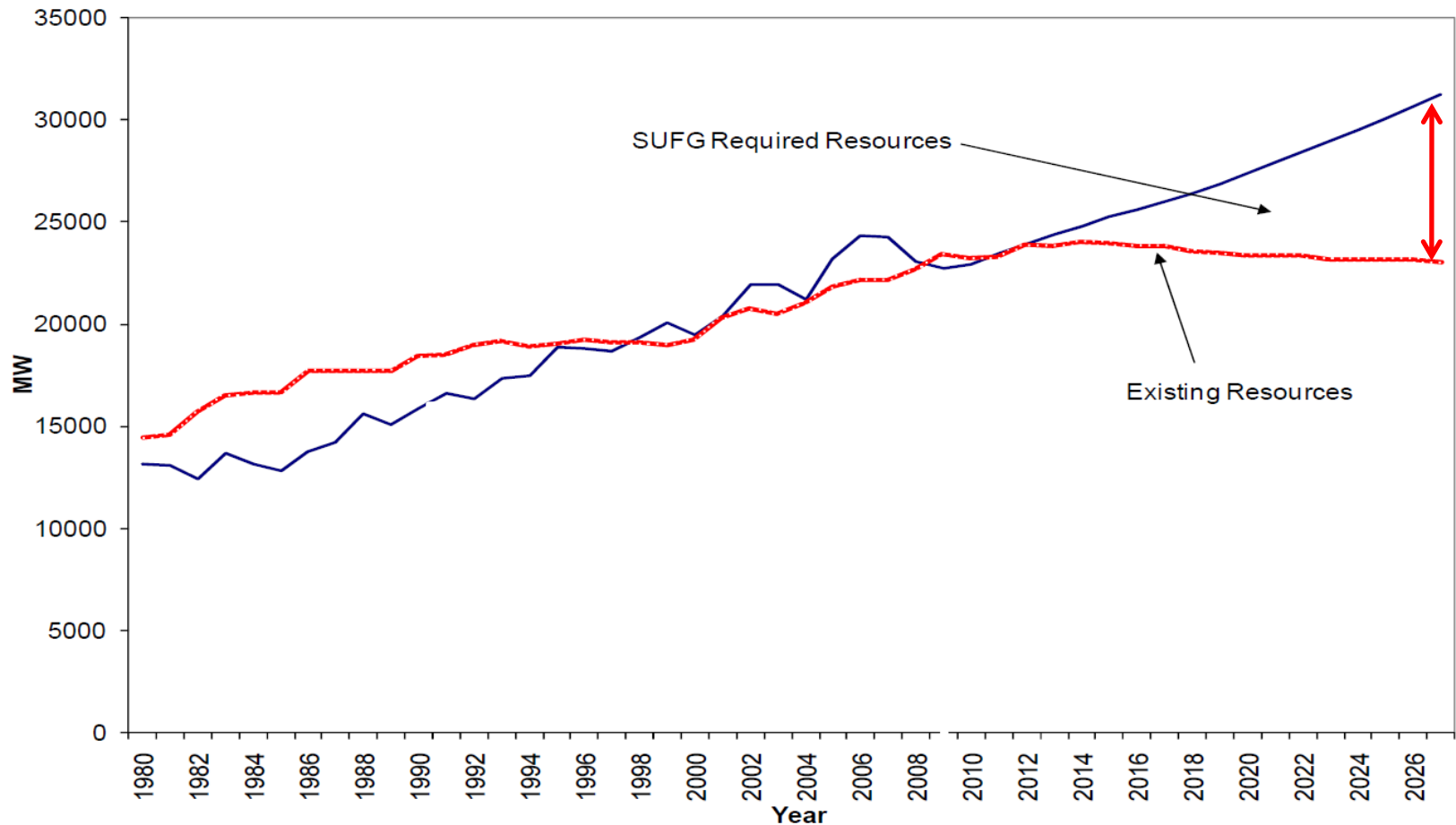
# Solar PV is a good Distributed Generation solution

- Easily located onsite
- Can be incorporated into architecture
- Out-performs other onsite options
- Technological advances are leading to greater efficiencies





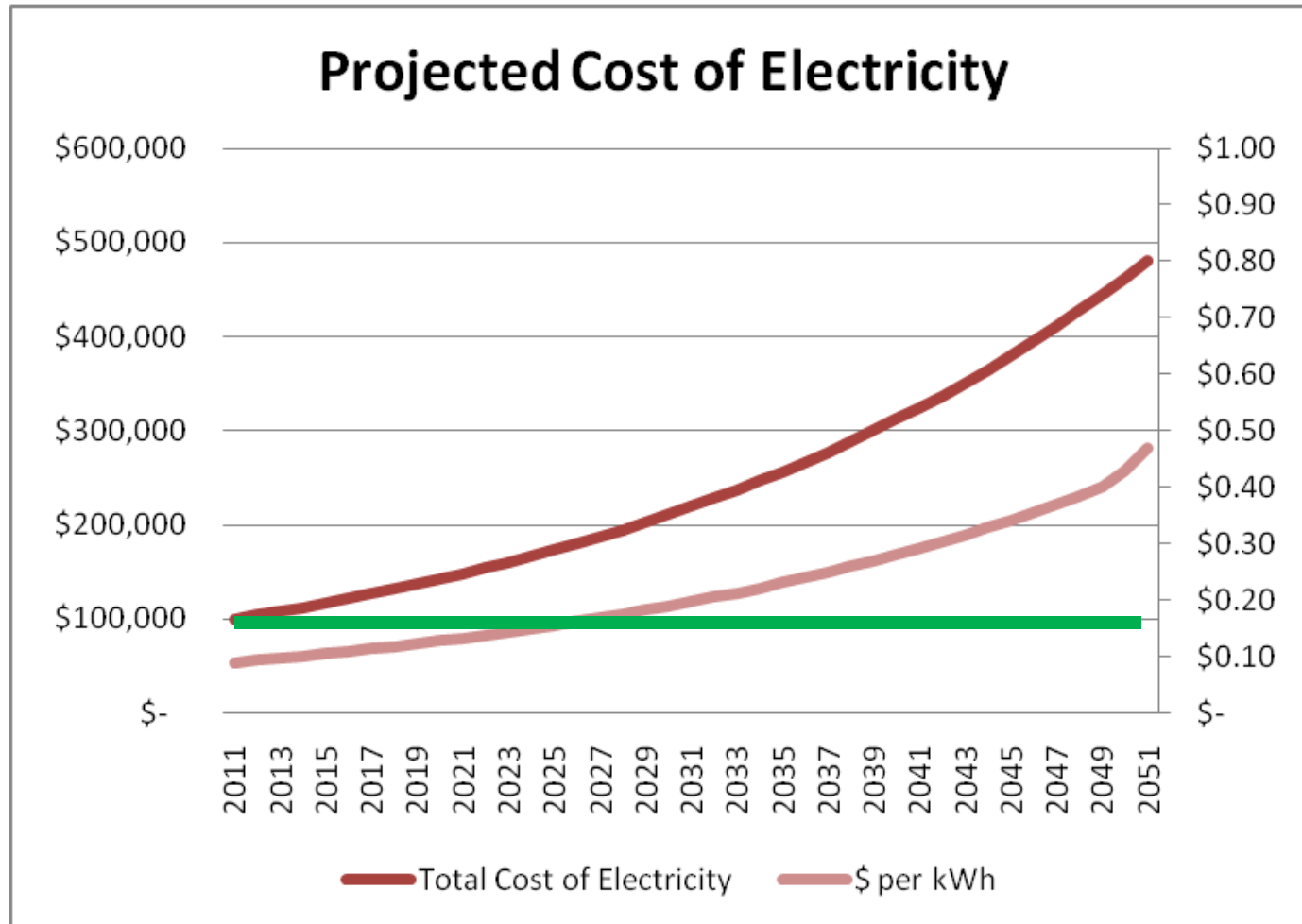
# We can meet our future generation capacity needs ... and ...



Source: State Utility Forecasting Group 2009 Energy Report



# ... your cost of electricity stays the same



# Good Day, Sunshine!

